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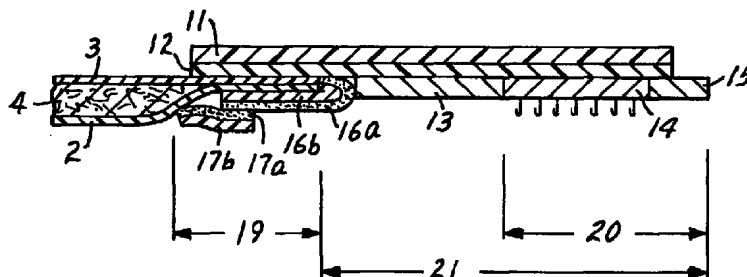
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### (54) Fastening tape

(57) The invention refers to mechanical a closure tape (10) for an absorbent article, particularly for a disposable diaper (1), for the fastening of the article on the body of a person, the mechanical closure tape (10) being attachable to the outside surface (3) of the diaper (1) through its manufacturer's end (19) and comprising a backing (11) bearing an adhesive layer (12), optionally a covering film (13), a fastening means (14), optionally a fingerlift (15) and a one-sided adhesive tape (16) hav-

ing a backing (16b) bearing an adhesive layer (16a), the adhesive tape (16) being attachable to the inside surface (2) of the diaper and/or to the connective portion (21) of the closure tape (10) by means of the adhesive layer (16a), by means of the adhesive layer (12) and/or by means of one or more one-sided further adhesive tapes so that the adhesive layer (16a) is at least partially exposed above the inside surface (2) of the diaper.



**FIG. 3a**

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## Description

### Field of the invention

[0001] The present invention relates to a mechanical closure tape for an absorbent article, particularly for a disposable diaper, which

- allows to fasten the article on the body of a person during use employing a mechanical fastening means,
- allows to secure the soiled diaper after use for disposal (disposability feature), and
- is furthermore designed not to pop open when folded onto the inside surface of the diaper prior to use (anti-flagging feature).

[0002] The present invention also relates to a prelaminated mechanical closure tape in a stable roll form from which the mechanical closure tape can be cut. The present invention furthermore refers to a method of preparing said mechanical closure tape and to an absorbent article comprising said mechanical closure tape.

### Background of the invention

[0003] Closure tapes for absorbent articles having some or all of the above features, are described in the art. Fig. 4 of the Japanese patent (kokoku) JP 08-2,365 shows a mechanical closure tape which is attached to the outside surface of the diaper through its manufacturer's end (L<sub>1</sub>) and which carries on its connective portion (L-L<sub>1</sub>) a hook fastening element 6B and two small strips 6C<sub>1</sub> and 6C<sub>2</sub> of a temporary holding adhesive on both sides of the hook fastening element 6B. On folding the connective portion of the mechanical closure tape onto the inside surface of the diaper, the temporary holding adhesive strips are transferred as 6C<sub>6</sub> and 6C<sub>7</sub> onto the inside surface of the diaper as can be seen in Fig. 7 of JP 08-2,365. The adhesive strips temporarily secure the connective portion of the mechanical closure tape to the inside surface of the diaper and prevent the mechanical closure tape from popping open when handling semi-finished absorbent articles during the process of manufacturing or when storing, packaging or transporting the finished absorbent article. The property of the mechanical closure tape not to pop open is often also referred to as anti-flagging feature. When the diaper described in JP 08-2,365 is applied to the wearer's body, the connective portion of the closure tape is removed from the inner surface of the diaper leaving the two adhesive strips 6C<sub>6</sub> and 6C<sub>7</sub> behind, and it is attached by means of the hook fastening element 6B onto a complementary mechanical fastening element on the landing zone of the diaper. Mechanical fastening elements are preferred over adhesive fastening elements because mechanical fastening elements tend not to be adversely affected by skin creams or powders and

can easily be released and re-closed. The mechanical closure tape of JP 08-2,365 does not provide, however, a disposal feature.

[0004] EP 0,321,232 discloses mechanical closure tapes for disposable absorbent articles, particularly diapers, comprising on their connective portion a mechanical hook fastening element. While the mechanical hook fastening element is engagable with a complimentary mechanical loop fastening element on the landing zone of the diaper and thus secures the diaper to the wearer's body during use, the exposed adhesive fastening element provides for an anti-flagging feature and can furthermore adhere to the outside surface of the diaper when it is rolled up for disposal. EP 0,321,232 does not disclose a prelaminated mechanical closure tape in a stable roll from which the mechanical closure tape can be cut.

[0005] It is pointed out in EP 0,780,109 that when applying closure tapes having fastening means on the connective portion of the closure tape only, to the front part of the diaper including the landing zone, such front part may tend to fold down thereby creating a hard transition zone between the front portion and the diaper ear to which the manufacturer's end of the closure tape is attached. The transition area may contact the wearer's skin and result in skin irritations. In order to avoid such misalignment, EP 0,780,109 discloses a two-point closure tape comprising in addition to the fastening means on the connective portion of the closure tape, an exposed adhesive fastening means on the opposite part of the closure tape which covers a part of the inside surface of the diaper. The manufacture of mechanical closure tapes according to EP 0,780,109 requires, however, strip-coating and the use of double-coated adhesive tapes.

[0006] It was therefore an object of the present invention to provide a mechanical closure tape having both a disposability and an anti-flagging feature which does not have the shortcomings of the mechanical closure tapes disclosed in the state-of-the-art and which is easy to manufacture. It was another object of the present invention to provide a prelaminated mechanical closure having both a disposability and an anti-flagging feature, in a stable roll form. It was another object of the present invention to provide a simple and economically advantageous method of preparing such prelaminated mechanical closure tape in a stable roll form. Other objects of the present invention are evident from the following description of the invention.

### Brief description of the invention

[0007] The invention relates to a mechanical closure tape 10 for an absorbent article, particularly for a disposable diaper 1, for fastening of the article on the body of a person, the mechanical fastening tape 10 being attachable to the outside surface 3 of the diaper 1 through its manufacturer's end 19 and comprising a

backing 11 bearing an adhesive layer 12, optionally a covering film 13, a mechanical fastening means 14, optionally a fingerlift 15 and a one-sided adhesive tape 16 having a backing 16b bearing an adhesive layer 16a, the adhesive tape 16 being attachable to the inside surface 2 of the diaper and/or to the connective portion 21 of the closure tape 10 by means of the adhesive layer 16a, by means of the adhesive layer 12 and/or by means of one or more further one-sided adhesive tapes so that the adhesive layer 16a is at least partially exposed above the inside surface 2 of the diaper.

[0008] The invention furthermore relates to a prelaminated closure tape according to the invention coiled into a stable roll form and to an absorbent article comprising at least one closure tape according to the present invention.

#### Brief description of the figures

[0009]

Fig. 1 is a perspective representation of a disposable diaper 1 in a closed form, having an absorbent core 4 between an inside surface 2 and an outside surface 3, mechanical closure tapes 10 anchored to the edge portions 6 of the diaper 1 and fastened to the target area 5 on the outside surface of the diaper.

Fig. 2 is a perspective representation of the precursor of a preferred embodiment of the mechanical closure tape 10 according to the invention comprising a backing 11 bearing a continuous adhesive layer 12, a covering film 13, a mechanical hook fastening means 14, a fingerlift 15, a first one-sided adhesive tape 16 and a second one-sided adhesive tape 17.

Fig. 3a is a cross-sectional view of the mechanical closure tape 10 obtainable from the precursor of Fig. 2 being attached to the edge portion of a diaper 6 wherein the one-sided adhesive tape 16 is distally adhered with its adhesive layer 16a to the adhesive layer 12.

Fig. 3b is a cross-sectional view of another preferred embodiment of a mechanical closure tape 10 which differs from the closure tape of Fig. 3a in that the one-sided adhesive tape 16 is distally adhered with its backing layer 16b to the adhesive layer 12.

Fig. 4 is a cross-sectional view of the precursor of another preferred embodiment of a mechanical closure tape 10 according to the invention which differs from the embodiment

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

of Fig. 2 in that the proximal end of the covering film 13 is folded back upon itself.

is a cross-sectional view of the mechanical closure tape 10 obtainable from the precursor of Fig. 4, being attached to the edge portion of a diaper.

is a cross-sectional view of the precursor of another preferred embodiment of a mechanical closure tape 10 according to the invention which differs from the embodiment of Fig. 2 in that the adhesive tape 16 is securable to the adhesive layer 12 by means of a third one-sided adhesive tape 18.

is a cross-sectional view of the mechanical closure tape 10 obtainable from the precursor of Fig. 6, being attached to the edge portion of a diaper.

is a cross-sectional view of another preferred embodiment of a mechanical closure tape 10 according to the invention comprising a backing 11 bearing a continuous adhesive layer 12, a mechanical hook fastening means 14, a fingerlift 15 and a one-sided pressure sensitive adhesive tape 16 which is folded twice on itself so that it has a first part 16I adhered to the pressure sensitive adhesive layer 12, a second part 16II the adhesive layer 16a of which being exposed and a third part 16III between the first and second part of adhesive tape 16 so that the adhesive layer 16a of the third part 16III contacts the backing 16b of the first part 16I of the adhesive tape 16.

is a cross-sectional view of the mechanical closure tape 10 of Fig. 8 being attached to the edge portion of a diaper.

is a cross-sectional view of the precursor of another preferred embodiment of a mechanical closure tape 10 according to the invention, having a one-sided adhesive tape 16 contacting the adhesive layer 12 (broken lines) the proximal end of which being folded on itself with the adhesive layer facing outwards.

is a cross-sectional view of the mechanical closure tape 10 obtainable from the precursor of Fig. 10, being attached to the edge portion of a diaper.

is a cross-sectional view of the precursor of

another embodiment of a mechanical closure tape 10 according to the present invention comprising a backing 11 bearing a continuous adhesive layer 12, a covering film 13, a mechanical hook fastening means 14 and a fingerlift 15, and a one-sided adhesive tape 16 which bears on each of its distal and proximal ends, respectively, a second and third adhesive layer 17 or 18, respectively.

Fig. 13 is a cross-sectional view of the mechanical closure tape 10 which is obtainable by applying the precursor of Fig. 12 to the edge portion of a diaper.

Fig. 14 is a schematic representation of the method of manufacture of the mechanical closure tape according to Fig. 3a and a corresponding apparatus, said method comprising unwinding of the backing 11 bearing adhesive layer 12 from roll 50, of the fingerlift 15 from roll 51, of the mechanical fastening means 14 from roll 52, of the covering film 13 from roll 53, of the first and second one-sided adhesive tapes 16 and 17, respectively, from rolls 54 and 55, respectively, passing the above component in the order given through two laminator rolls 56 and 57, and winding up the resulting mechanical closure tape on roll 58.

#### Detailed description of the invention

[0010] The mechanical closure tapes 10 of the present invention are useful and beneficial when attached to an absorbent article and, in particular, to a disposable absorbent article. As used herein, the term "disposable absorbent article" refers to articles which are placed against or in proximity to the body of the wearer to absorb and contain the various exudates discharged from the body and which are intended to be disposed of after single use (i.e., they are not intended to be laundered or otherwise restored or reused).

[0011] A preferred embodiment of the disposable absorbent article of the present invention is a diaper. As used herein, the term "diaper" refers to a garment generally worn by infants or incontinent persons that is drawn up between the legs and fastened about the waist of the wearer.

[0012] The term "mechanical closure tape" as used herein denotes a closure tape having a mechanical fastening means 14 for securing the absorbent article to the wearer's body during use. The term "manufacturer's end" refers to the part 19 of the closure tape which is attached to the outside surface 3 of the diaper 1. The term "connective portion" 21 refers to the part of the closure tape 10 which forms the free end of the closure

tape 10. The term "user's end" refers to the part 20 of the closure tape 10 comprising the mechanical fastening means 14 and the fingerlift 15. These parts of the closure tape are shown in Fig. 3a.

[0013] Fig. 1 is a partially cut-away perspective representation of a disposable diaper 1 in a closed form. The diaper comprises an absorbent core 4 between an inside surface 2 and an outside surface 3. The absorbent core 4 may be any means which is generally compressible, conformable, non-irritating to the wearer's skin, and capable of absorbing and retaining liquids and certain body exudates.

[0014] The outside surface 3 of the diaper is impervious to liquids and is preferably manufactured from a thin plastic film, although other flexible, liquid impervious materials may also be used. The outside surface 3 prevents the exudates absorbed and contained in the absorbent core 4, from soiling articles which contact the diaper 1 such as bedsheets and undergarments.

[0015] The inside surface 2 of the diaper is compliant, soft-feeling, and non-irritating to the wearer's skin. Further, the inside surface 2 is liquid pervious permitting liquids to readily penetrate through its thickness. A suitable inside surface 2 may be manufactured from a wide range of materials such as porous foams, reticulated foams, apertured films, natural fibers (e.g., wood or cotton fibers), synthetic fibers (e.g., polyester or polypropylene fibers) or from a combination of natural and synthetic fibers. Preferably, it is made of a hydrophobic material to isolate the wearer's skin from liquids retained in the absorbent core 4. A suitable inside surface 2 may be, for example, a spunbond or carded polypropylene nonwoven of approximately 15-25 g/m<sup>2</sup>.

[0016] The absorbent core 4 may be secured to the outside surface 3 by means of, for example, pressure-sensitive adhesives, hot melt adhesives or other adhesives, ultrasonic bonding or heat/pressure sealing. The outside surface 3 and the inside surface 2 may be joined to each other directly or indirectly by using an intermediate fixing member to which the outside surface 3 and the inside surface are affixed. The inside surface 2 and the outside surface 3 may be associated together by various means comprising, for example, pressure-sensitive adhesives, hot melt adhesives or other adhesives, ultrasonic bonding and/or heat and/or pressure.

[0017] The above description of the diaper 1 is meant to be explanatory only and not limiting. Further details on diapers and their construction are described in literature and may be taken, for example, from EP 0,529,681, US 4,036,233, EP 0,487,758, WO 96/10,382, US 3,800,796, EP 0,247,855 or US 4,857,067.

[0018] The mechanical closure tape 10 is secured to the edge portion 6 of the diaper 1 through its manufacturer's end 19 whereby several configurations are possible. In the embodiment of Fig. 13 the one-sided adhesive tape 16 is attached to the inside surface 2 of the diaper 1 only and has no connection to the connec-

tive portion 21 of the mechanical closure tape 10. In the embodiment of Fig. 3a the distal end of the adhesive layer 16a of the one-sided adhesive tape 16 is adhered to the adhesive layer 12 so that the mechanical closure tape 10 is attached both to the inside surface 2 and outside surface 3 of the diaper. The anchoring modes shown in Fig. 5 and 8 allow for especially reliably securing the mechanical closure tape 10 to the edge portion 6 of the diaper 1.

**[0019]** Anchoring modes other than those shown in the figures are possible. In an alternative construction, the backing 11 optionally comprising an adhesive layer 12, may be bonded at the manufacturer's end between the outside surface 3 and the inside surface 2 of the diaper.

**[0020]** In the closed state of the diaper 1, the mechanical fastening means 14 of the mechanical closure tape 10 is attached to the target area 5. The target area 5 may be formed of an additional strip which is attached to the outside surface 3 of the diaper 1 in such a manner that the size of the diaper or garment may be adjusted in accordance with the size of the user. The target area can comprise one or more such strips and could also form the entire outside surface 3 of the diaper. The outer surface of the target area 5 is selected to engage with the mechanical fastening means 14 of the mechanical closure tape 10 in an overlapping configuration to provide a secure side closure. For example, in case the fastening means 14 comprises a hook material, the outer surface of the target area will comprise any suitable material which interlocks with hook material such as, for example, woven or non-woven fabrics.

**[0021]** The absorbent article and, in particular, the disposable diaper 1 of the present invention differs from prior art contoured absorbent articles in that it comprises a novel mechanical closure tape 10. Fig. 2 shows a cross-sectional view of the precursor of a preferred embodiment of the mechanical closure tape.

**[0022]** The precursor of the mechanical closure tape 10 shown in Fig. 2 comprises a backing 11 which is preferably selected from a group of materials which is essentially non-elastic and imparts a desirable stiffness to the mechanical closure tape 10.

**[0023]** The backing 11 is especially preferably selected from a group of materials comprising polypropylene, polyvinylchloride, polyethylene terephthalate, polyethylene, polyolefin copolymers or blends of polyolefins such as, for example, blend of polypropylene and LPDE (low density polyethylene), non-woven and foamed materials. The thickness of the backing is preferably between 50  $\mu\text{m}$  and 500  $\mu\text{m}$ , and more preferably between 80  $\mu\text{m}$  and 150  $\mu\text{m}$ .

**[0024]** The backing 11 bears an adhesive layer 12 which preferably extends over the whole length of the mechanical closure tape 10 but may also cover only part of the backing 11. It is, for example, possible that the covering film 13 and the adhesive layer 12 in the area of the covering film 13, are omitted.

**[0025]** The adhesive of the adhesive layer 12 is preferably selected to permanently attach the manufacturer's end 19 of the backing 11 to the outside surface 3 of the diaper 1 during its manufacture so that the closure tape is not removed from the outside surface 3 of the diaper when the diaper 1 is used and opened or closed several times. Likewise, the adhesive of adhesive layer 12 is selected to permanently adhere the covering film 13, if present, the fastening means 14 and the fingerlift 15, if present, to the backing 11. The adhesive useful for adhesive layer 12 comprises pressure-sensitive adhesives including pressure-sensitive hot-melt adhesives and non-pressure-sensitive adhesives. The pressure-sensitive adhesives which are preferred, are preferably selected to exhibit a 90° peel adhesion from a polyethylene surface as measured according to a slightly modified test method FTM2, FINAT test method no. 2, FINAT Technisches Handbuch, 4. Auflage (1995), pp. 6-7 of at least 3.5 N/cm, more preferably of at least 5 N/cm and especially preferably of at least 6 N/cm. The test method used deviates from FTM2 in that a polyethylene film STA-211 (thickness 150  $\mu\text{m}$ , adhered to a stainless steel substrate with a double-sided adhesive film) is used as the test substrate and in that the peel adhesion measurement is performed 2 min after applying the adhesive strip to the substrate. The pressure-sensitive adhesive furthermore preferably exhibits a high value of static shear as measured according to a slightly modified test method FTM8, FINAT test method no. 8, FINAT Technisches Handbuch, 4. Auflage (1995), pp. 15-16, of at least 100 min, more preferably of at least 300 min and especially preferably of at least 500 min to ensure that the diaper does not inadvertently come loose from the wearer's body. The test method used deviates from FTM8 in that a weight of 500 g is used instead of 1000 g, that the temperature is  $38 \pm 2^\circ\text{C}$  instead of  $23 \pm 2^\circ\text{C}$  and that the test specimen comprises a polyethylene film (thickness 40  $\mu\text{m}$ ) as the test substrate and a propylene backing with a thickness of 110  $\mu\text{m}$  with the adhesive to be tested attached to it as the adhesive strip which bears the weight.

**[0026]** Suitable pressure-sensitive adhesives include rubber-based adhesives (also called rubber-resin adhesives) which comprise natural or synthetic rubber materials and typically also tackifying resins in order to render the rubber materials tacky. Preferred examples of rubber-based pressure-sensitive adhesives are the polystyrene polyisoprene block copolymers tackified with synthetic polyterpene resins or hydrocarbon resins. Suitable pressure-sensitive adhesives furthermore include acrylate-based pressure-sensitive adhesives such as, for example, those disclosed in US Re 24,906 or US 4,710,536. The adhesives mentioned above are given only by way of example, and the person skilled in the art can select other adhesives known in the state of the art without any inventive effort. The thickness of the adhesive layer 12 preferably is between 10 and 200  $\mu\text{m}$  and more preferably between 20 and 100  $\mu\text{m}$ .

[0027] The exposed surface of the backing 11 preferably has release properties and/or is treated with a release coating so that the backing 11 bearing the adhesive layer 12 can be wound up to a roll without requiring a release liner. The release coating may be any of the known materials used for their release properties for adhesives. Preferred types are silicones and modified silicones, the modification including both copolymerization of silicones with other non-release chemical agents or by adding non-silicone materials to the silicone coating solution prior to application to the release base paper. Other release agents such as polyethylene, fluorocarbons and polyvinyl octadecyl carbamate may also be used. The choice of release coating is dependent on the tack, adhesion level, and chemical nature of the adhesive layer 12.

[0028] The covering film 13, if present, is preferably selected from a group of materials comprising polyolefin homopolymers or copolymers such as, for example, homopolymers or copolymers of ethylene and/or propylene, polyesters or blends comprising such polymers. The thickness of the covering film 13 preferably is between 50 and 100  $\mu\text{m}$  and more preferably is between 10 and 40  $\mu\text{m}$ .

[0029] The mechanical fastening means 14 is the male or female part, respectively, of a mechanical closure system comprising two interlocking means. The closure system may be, for example, a hook-and-loop system. The fastening means 14 may comprise the hook fastener or the loop fastener means, respectively, but it preferably comprises the hook fastener means. The hook fastener means may have any shape such as hooks, "T's" or any other shape as are well known in the art. The hook fastener material may be manufactured from a wide range of materials including nylon, polyester, polyolefins or any combination of these. A preferred hook material comprises a base and a plurality of engaging elements which comprise a stem supported at the base and an enlarged head which is positioned at the end of the stem opposite of the base. Such hook material is commercially available from 3M Company, St. Paul, U.S.A. under the trade designation KN-2396.

[0030] The loop material may be comprised of woven or non-woven fabric or any other suitable material which interlocks with the contemplated hook fastener material. A suitable loop fastening material comprises a number of fiber loops projecting from a woven backing such as the Knitted Loop Tape EKL-1112, commercially available from 3M Company, St. Paul, U.S.A. The mechanical fastening means 14 preferably has an extension in cross-direction (i.e. in the direction of the long axis of the mechanical closure tape 10) of between 10 and 40 mm, and more preferably of between 15 and 30 mm.

[0031] The fingerlift 15 may optionally be attached to the distal end of the connective portion 21 to allow for easier handling of the mechanical closure tape 10. The fingerlift 15 may partly extend over the distal end of the backing 11 as is shown, for example, in Fig. 2. In

another embodiment, the backing 11 may extend over the distal end of the adhesive layer 12 and, optionally, be folded back onto the adhesive layer 12 to provide for a fingerlift 15. Alternatively the fingerlift 15 may be attached to the backing 11 by different welding techniques such as, for example, ultrasonic welding. The fingerlift 15, if present, preferably has an extension in cross-direction of typically between 3 and 10 mm, a thickness of between 25 and 200  $\mu\text{m}$  and it is preferably prepared from a group of materials comprising polymer films and non-wovens.

[0032] The mechanical closure tape 10 according to the present invention furthermore comprises a one-sided adhesive tape 16 having a backing 16b and an adhesive layer 16a. The one-sided adhesive tape 16 is applied to the inside surface 2 of the diaper and/or to the connective portion 21 of the mechanical closure tape 10 by means of the adhesive layer 16a, by means of adhesive layer 12 and/or by means of one or more one-sided further adhesive tapes so that the adhesive layer 16a faces away from the inside surface 2 of the diaper and is at least partially exposed above the inside surface of the diaper.

[0033] Mounting of the one-sided adhesive tape 16 to the inside surface 2 of the diaper 1 and/or the connective portion 21 of the mechanical closure tape 10 can be effected in various ways, and some preferred, non-limiting constructions are schematically shown in Figures 2 - 13.

[0034] Fig. 2 shows the precursor of the mechanical closure tape of Fig. 3a. A laminate is provided comprising one-sided adhesive tape 16 and a further one-sided adhesive tape 17 having an adhesive layer 17a and a backing 17b. The distal end of the adhesive layer 16a of tape 16 is laminated to the adhesive layer 17a of tape 17 in an overlapping fashion so that the adhesive tape extends over the distal edge of adhesive tape 16. The closure tape 10 is obtained by laminating the proximal end of the adhesive layer 16a of tape 16 to adhesive layer 12 adjacent to the proximal end of the cover film 13.

[0035] Fig. 3a shows the closure tape 10 obtained from the precursor of Fig. 2 being applied to the edge portion 6 of a diaper 1. The laminate comprising one-sided adhesive tapes 16 and 17, respectively, which is distally adhered by adhesive layer 16a to the adhesive layer 12, has been folded back so that the laminate is proximally adhered to the inside surface 2 of the diaper by means of adhesive layer 17a. The adhesive layer 16a faces away from the inside surface of the diaper and is exposed.

[0036] During the manufacture of the diaper 1 and/or when packaging and storing it prior to use, the connective portion 21 of the mechanical closure tape 10 as shown in Fig. 3a is usually folded onto the inside surface 2 of the diaper 1 thereby contacting the exposed adhesive layer 16a of one-sided adhesive tape 16. In the embodiment of Fig. 3a which is preferred, the connec-

tive portion 21 contacts the adhesive layer 16a via the covering film 13. The adhesive used in the adhesive layer 16a is selected so that

- the connective portion 21 can be releasably adhered to adhesive layer 16a to provide for an anti-flagging feature, and
- the adhesive layer 16 can be reliably adhered to the backside surface 3 of the diaper to provide for a disposability feature.

**[0037]** The adhesion behavior is governed by the nature of the adhesive layer 16a and by the surface properties of the covering film 13 or the backside surface 3 of the diaper 1, respectively. When using for example, an aggressive pressure sensitive adhesive in order to allow for reliably securing of the exuded diaper 1, the covering film 13 typically comprises a film having appropriate release surface properties and/or a release coating. When using, for example, an aggressive pressure sensitive adhesive material for adhesive layer 16a, which is selected from the pressure sensitive adhesive materials described above for use in adhesive layer 12, the covering film 13 preferably has a release coating. Suitable release coatings may be selected from the group of release materials described above for the backing 11. The person skilled in the art can modify the nature of the adhesive material of adhesive layer 16a and/or the covering film 13, respectively, or the surface release properties of the covering film 13 in order to provide the desired adhesion behavior between adhesive layer 16a and the covering film 13 or the backside surface 3 of the diaper 1, respectively.

**[0038]** The backing layer 16b of the one-sided adhesive tape 16 may be manufactured from a wide range of materials such as polymer films or paper films. The backing is preferably selected from a group of materials comprising polypropylene, polyvinylchloride, polyethylene terephthalate, polyethylene, polyolefin copolymers or blends of polyolefins such as, for example, a blend of polypropylene and LDPE (low density polyethylene), non-wovens and foamed materials.

**[0039]** The thickness of the backing 16b preferably is between 50  $\mu\text{m}$  and 300  $\mu\text{m}$  and more preferably between 50  $\mu\text{m}$  and 250  $\mu\text{m}$ . The thickness of the adhesive layer 16a preferably is between 30  $\mu\text{m}$  and 150  $\mu\text{m}$  and more preferably between 30  $\mu\text{m}$  and 100  $\mu\text{m}$ . The extension of the one-sided adhesive tape 16 in cross-section is preferably selected so that the area of exposed adhesive above the inside surface 2 of the diaper 1 is between 10  $\text{mm}^2$  and 30  $\text{mm}^2$  and more preferably between 12 and 20  $\text{mm}^2$ . The surface of the backing 16 which is opposite to the surface bearing the adhesive layer 16a, preferably has release properties and/or is treated with a release coating so that the adhesive tape 16 can be wound up to a roll without requiring a release liner.

**[0040]** As can be seen from Fig. 3a, the one-sided

adhesive tape 16 is adhered to the inside surface 2 of the diaper 1 by means of a second one-sided adhesive tape 17 having an adhesive layer 17a and a backing 17b. Adhesive tape 17 is adhered with its adhesive layer 17a to the proximal end of adhesive layer 16a (Fig.3a), and it extends beyond the proximal edge of adhesive tape 16. The portion of adhesive tape 17 overlapping with adhesive tape 16, preferably has a width in cross-direction of between 3 and 10 mm, and the width of the extending portion of the adhesive tape 17 in cross-direction likewise preferably is between 3 and 10 mm in order to allow for secure anchoring of adhesive tape 16.

**[0041]** The material of the adhesive layer 17a, of the backing 17b and the thicknesses of these layers are preferably chosen using the guidelines given above for the corresponding layers of adhesive tape 16.

**[0042]** The embodiment of the mechanical closure tape 10 which is shown in Fig. 3b differs from the embodiment of Fig. 3a in that the one-sided adhesive tape 16 is distally adhered to the adhesive layer 12 by means of the backing 16b. The closure tape 10 of Fig. 3b can be obtained from the precursor of Fig. 2 by appropriately choosing the orientation of the laminate comprising one-sided adhesive tapes 16 and 17. In case the outside surface of the backing 16b (which surface is opposite to the surface of backing 16b adhered to the adhesive layer 16a) comprises a release coating, such release coating preferably is not present at least at the distal end of the adhesive tape 16 to allow for reliably securing the backing 16b to the adhesive layer 12. This can be obtained, for example, by strip-coating a release coating onto the outside surface of the backing 16b. It is also possible not to apply a release coating to the outside surface of 16b and cover the adhesive layer 16a with a release liner in order to allow for winding up the one-sided adhesive 16 in a roll for storage prior to lamination.

**[0043]** The precursor of the embodiment of the mechanical closure tape 10 according to the present invention which is shown in Fig. 4, differs from the precursor of Fig. 2 only in that the proximal end of the covering film 13 is folded back onto itself. Fig. 5 shows the mechanical closure tape 10 which is obtained from the precursor of Fig. 4, being applied to the inside surface 2 of the edge portion 6 of the diaper 1. The folded part of the covering film 13 has been unfolded and overlaps with the distal end of adhesive layer 16a by preferably 3 - 10 mm and more preferably 3 - 5 mm. The configuration of Fig. 5 provides for an especially reliable and strong attachment of the mechanical closure tape 10 to the diaper 1 which is usually termed as shear mode or Y mode type of attachment.

**[0044]** The precursor of the embodiment of the mechanical closure tape 10 of the present invention which is shown in Fig. 6, provides a shear mode or Y mode type of attachment by using an additional one-sided adhesive tape 18 which is distally adhered with its adhesive layer 18a to adhesive layer 12 or, alternatively,

to covering film 13 (not shown). In the embodiment of Fig. 6 it is also possible to use a polymeric film instead of the one-sided adhesive tape 18. Such polymeric film is preferably selected from the group of materials specified for backing 16b above. In the precursor of Fig. 6 such polymeric film is distally secured to adhesive layer 12. Adhesive tape 18, if present, comprises a backing 18b and an adhesive layer 18a. The materials used for such layers and their respective thicknesses are selected following the guidelines given above for adhesive tape 17. Similarly to adhesive tape 17, the proximal end of adhesive tape 18 is applied to the distal end portion of adhesive layer 16a with its adhesive layer 18a in an overlapping fashion so that it extends over the distal edge of adhesive tape 16 (Fig. 7). The dimensions of the overlapping and extending portion, respectively, of adhesive tape 18 are selected following the guidelines given above for adhesive tape 17. Fig. 7 shows the mechanical closure tape 10 which is obtainable from the precursor of Fig. 6, being applied to the inside surface 2 of the edge portion 6 of the diaper 1. One-sided adhesive tape 18 proximally secures the distal end of adhesive tape 16 and it is distally adhered to adhesive layer 12 or, alternatively, covering film 13 (not shown).

**[0045]** The embodiments of the mechanical closure tape 10 shown in Fig. 8 and 10, respectively, differ from the embodiments of Figs. 2, 4 and 6, respectively, in that no additional one-sided adhesive tape is required other than one-sided adhesive tape 16.

**[0046]** The embodiment of the closure tape 10 shown in Fig. 8 comprises a one-sided adhesive tape 16 which is folded twice on itself so that it has a first part 16I which is adhered to the pressure sensitive adhesive layer 12, a second part 16II the adhesive layer 16a of which being exposed and a third part 16III between the first and the second part of adhesive tape 16 so that the adhesive layer of the third part 16III contacts the backing 16b of the first part of the adhesive tape 16. Fig. 9 shows that the one-sided adhesive layer 16a is partly unfolded in order to adhere the adhesive layer 16a of the second part 16II of adhesive tape 16 to the inside surface 2 of the diaper 1. The third part 16III of the adhesive tape 16 remains folded onto the second part so that the adhesive layer 16a of the third part 16III is exposed and provides for a disposability and anti-flagging feature.

**[0047]** The dimensions of the one-sided adhesive tape 16 in the embodiment of Fig. 8, 9 are preferably selected so that the contact area between adhesive layer 12 and adhesive layer 16a has a width in cross-direction of between 5 and 50 mm and more preferably of between 10 and 25 mm, and so that the exposed third part of the adhesive layer 16a over the inside surface 2 of the diaper 1 preferably is between 5 and 50 mm and more preferably between 10 and 25 mm wide.

**[0048]** In the folded state of Fig. 8, the pressure sensitive adhesive layer 16a of the third part 16III of the one-sided pressure sensitive adhesive tape 16 adheres

to the backing 16b of the first part 16I of tape 16 thus releasably securing tape 16 in the folded state. In the unfolded state of Fig. 9, the third part 16III of the adhesive tape 16, the adhesive layer 16a of which is exposed, tends to remain flat and to not pop apart because the third part 16III of the one-sided adhesive tape 16 is strongly and flatly folded onto the backing 16b of the second part 16II of the adhesive tape 16. Alternatively, the backing 16b of the third part 16III of adhesive tape 16 may be adhered to the backing 16b of its second part 16II using, for example, a small spot 30 of an adhesive, wax or the like. It is also possible to attach the third part 16III of adhesive tape 16 to its second part 16II by ultrasonic spot bonding or heat spot bonding.

**[0049]** Fig. 10 shows the precursor of a mechanical closure tape 10 according to the present invention. The one-sided adhesive film 16 is distally folded upon itself, and the precursor is converted to the corresponding closure tape 10 by laminating the proximal end of the adhesive layer 16a to the adhesive layer 12 adjacent to the proximal end of covering film 13.

**[0050]** Fig. 11 shows the closure tape 10 obtainable from the precursor of Fig. 10, being applied to the edge portion 6 of a diaper 1. The one-sided adhesive tape 16 is distally secured to the adhesive layer 12 by its adhesive layer 16a, and it is proximally adhered to the inside surface 2 of the diaper 1 by means of the adhesive layer 16a of the folded part of adhesive tape 16 (which part corresponds to the distal part of adhesive tape 16 in Fig. 10). The width of the folded proximal end part of adhesive layer 16a in Fig. 11 preferably is between 2 and 20 mm in order to provide for a reliable, secure bonding between the closure tape 10 and the inside surface of the diaper.

**[0051]** The one-sided adhesive tape 16 can also be applied to the inside surface 2 of the diaper by means of two further one-sided adhesive tapes 17 and 18 as is shown in Fig. 12 and 13. This embodiment is, however, less preferred because the connective portion 21 of the closure tape 10 is not connected to the inside surface of the diaper 1. This type of bonding is often referred to as a peel mode type of attachment.

**[0052]** The closure tape 10 of the present invention can be prepared in an easy and reliable manner. Fig. 14 shows a schematic representation of a preferred method and the corresponding equipment according to the present invention useful for making the mechanical closure tape 10 obtainable from the precursor of Fig. 2. The equipment comprises 6 unwind stands 50 - 55, respectively, feeding the backing 11 bearing a layer 12 (unwind stand 50), the fingerlift 15 (unwind stand 51), the mechanical fastening means 14 (unwind stand 52), the covering film 13 (unwind stand 53), the first one-sided adhesive layer 16 (unwind stand 54) and the second one-sided adhesive layer 17 (unwind stand 55), respectively, in the order given into a lamination device comprising two lamination rolls 56 and 57. The mechanical closure tape 10 which is thus obtained in a single



lamination step, can subsequently be wound up on roll 58 for storage.

[0053] The mechanical closure tapes 10 according to the present invention or their precursors, respectively, which are shown in Fig. 4, 6, 8, 10 and 12, respectively, or further embodiments can be obtained similarly. The mechanical closure tape of Fig. 8 requires double-fold- 5 ing of the one-sided adhesive tape 16 which can be performed by a conventional folding unit comprising one or more creasing wheels and one or more folding rollers and/or folding bars. Likewise, the proximal end of the precursor of the mechanical closure tape of Fig. 10 needs to be folded back onto itself prior to attaching the closure tape 10 to the edge portion of the diaper 1. 10

[0054] Absorbent articles such as diapers are mass products, and the closure tape 10 used therein must be 15

- user-friendly and easy to apply, and
- easy and comparatively cheap to manufacture.

[0055] The mechanical closure tape 10 of the present invention meets these requirements to a particularly high degree. The exposed part of adhesive layer 16a provides, in combination with the mechanical fastening means 14, a two-point closure system which reliably secures the diaper to the wearer's body during use, and it furthermore provides an anti-flagging and a disposal feature. The mechanical closure tape 10 is easy to manufacture. The mechanical closure tape which is obtainable from the precursor of Fig. 2, for example, can be obtained in a single lamination step which allows for a particularly high line speed of, for example, 100 m/min of the laminate or more. 20

[0056] Contrary to this, the manufacture of the closure tapes disclosed in EP 0,780,109 requires strip-coating and/or the use of double-coated adhesive tapes. Coating steps require subsequent drying of the tape construction which tends to decrease the manufacturing speed and to considerably increase the dimensions of the equipment because of the need for a drying station. Double-coated adhesive tapes require at least one release liner which has to be removed prior to the lamination step and discarded. Double-sided adhesive tapes increase the thickness of the part of the resulting closure tape where they are present. The resulting closure tapes are particularly inhomogenous in thickness which makes it difficult to wind them up in a stable roll form. 25 30 35 40 45

## Claims

1. A mechanical closure tape (10) for an absorbent article, particularly for a disposable diaper (1), for the fastening of the article on the body of a person, the mechanical closure tape (10) being attachable to the outside surface (3) of the diaper (1) through its manufacturer's end (19) and comprising a backing (11) bearing an adhesive layer (12), optionally a 55

covering film (13), a mechanical fastening means (14), optionally a fingerlift (15) and a one-sided adhesive tape (16) having a backing (16b) bearing an adhesive layer (16a), the adhesive tape (16) being attachable to the inside surface (2) of the diaper and/or to the connective portion (21) of the closure tape (10) by means of the adhesive layer (16a), by means of the adhesive layer (12) and/or by means of one or more one-sided further adhesive tapes so that the adhesive layer (16a) is at least partially exposed above the inside surface (2) of the diaper.

2. Mechanical closure tape according to claim 1 wherein the distal end of the adhesive tape (16) is attached to the adhesive layer (12) of the closure tape (10).
3. Mechanical closure tape according to claim 2 wherein the proximal end of the adhesive tape (16) is attached to the inside surface of the diaper with a one-sided adhesive tape (17).
4. Mechanical closure tape according to claim 2 wherein the proximal end of the polymer film (13) overlaps with the distal end of the adhesive tape (16).
5. Mechanical closure tape according to claim 2, wherein the proximal end of the adhesive tape (16) is folded back onto its backing (16b) to allow for adhering of the proximal end of the adhesive tape (16a) to the inside surface (2) of the absorbent article.
6. Mechanical closure tape according to claim 2 wherein the pressure sensitive adhesive tape (16) is folded twice on itself so that it has a first part adhered to the pressure sensitive adhesive layer (16), a second part the pressure sensitive adhesive layer (16a) of which being exposed and a third part between the first and second part of the adhesive tape (16) so that the adhesive layer (16a) of the third part contacts the backing (16b) of the first part of the adhesive tape (16).
7. Mechanical closure tape according to claim 2 where the distal end of the adhesive tape (16) is secured to the adhesive layer (12) by means of a one-sided pressure sensitive adhesive tape (18).
8. Absorbent article comprising a mechanical closure tape according to claim 1.
9. Prelaminated mechanical closure tape in a stable roll from which the mechanical closure tape for an absorbent article according to claim 1 can be cut.

10. Method for preparing a closure tape (10) according to claim 1, comprising laminating the backing (11) bearing adhesive layer (12), optionally the covering film (13), the mechanical fastening means (14), optionally the fingerlift (15), the one-sided adhesive tape (16) and, optionally, one or more further one-sided adhesive tapes. 5
11. Method according to claim 4 wherein the lamination is performed in one lamination device. 10

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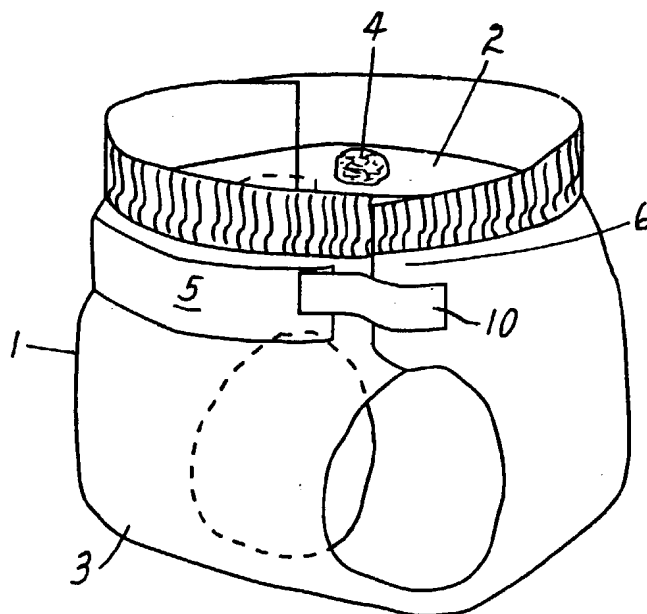


FIG. 1

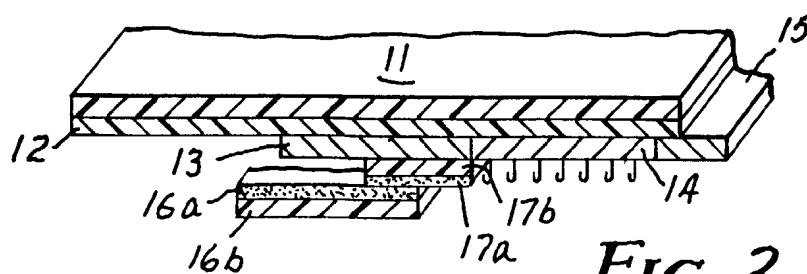


FIG. 2

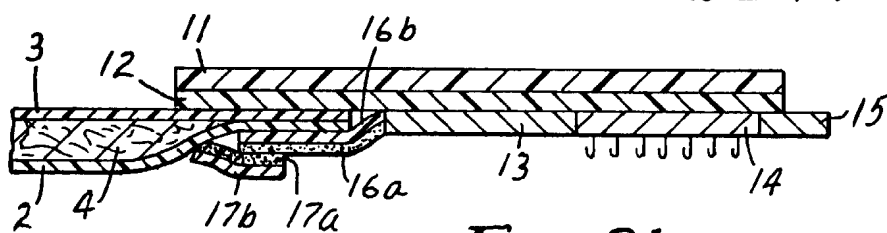


FIG. 3b

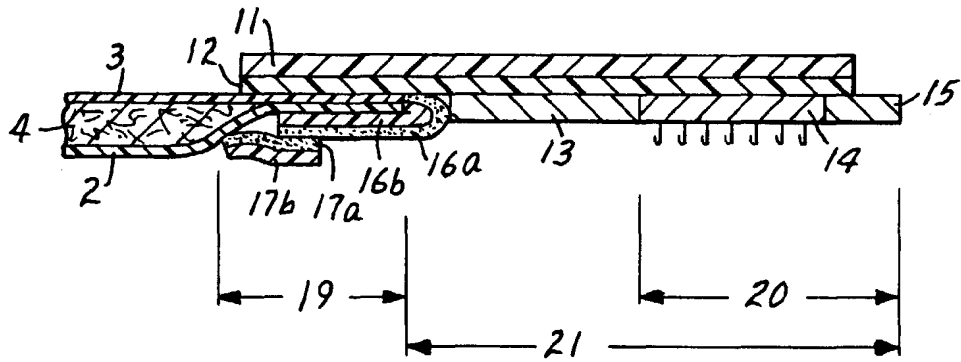


FIG. 3a

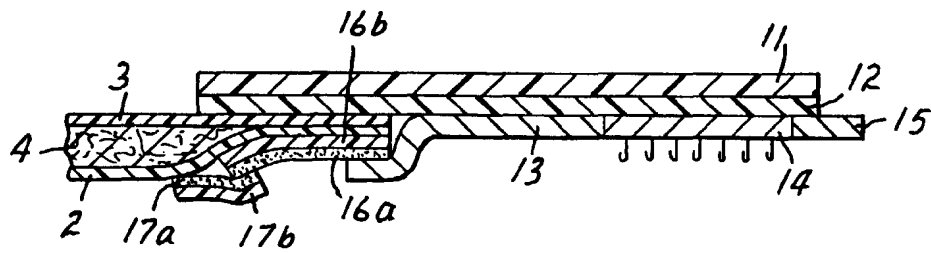
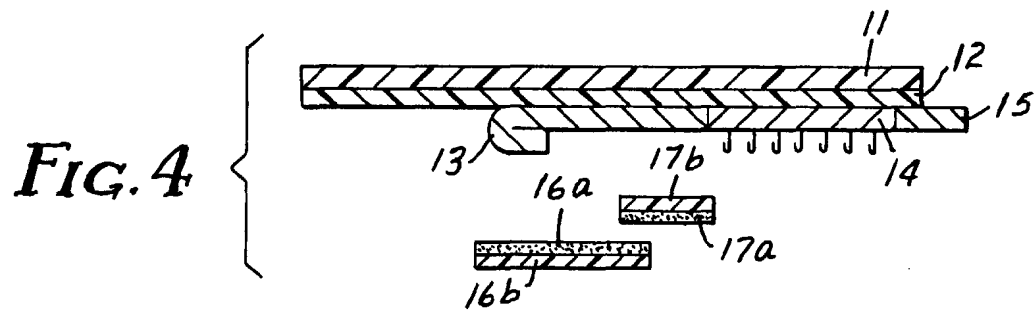
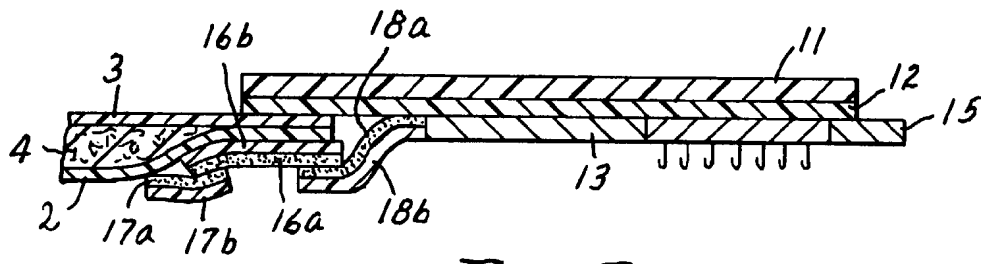
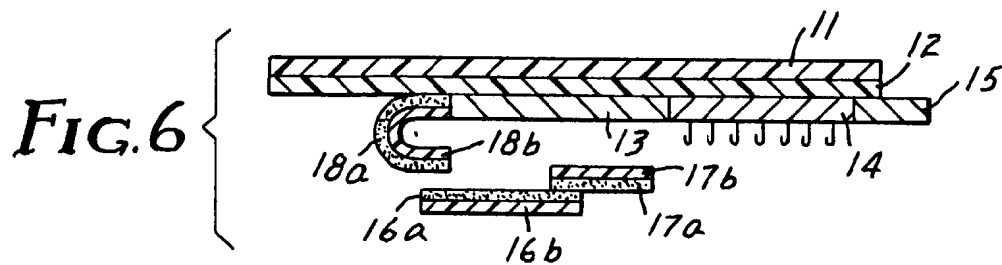
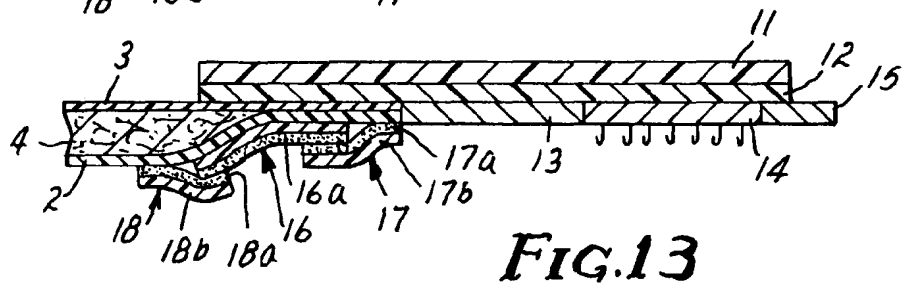
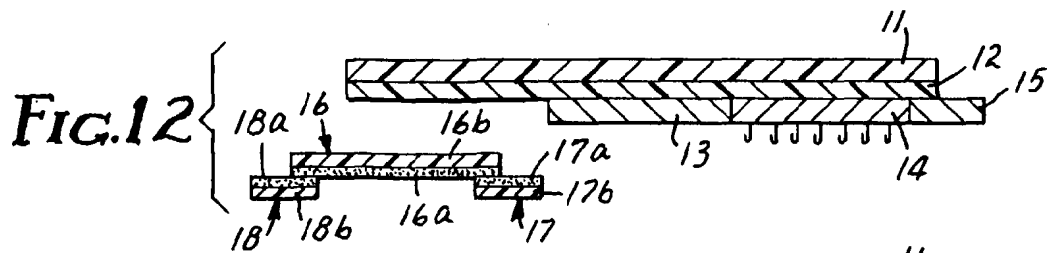
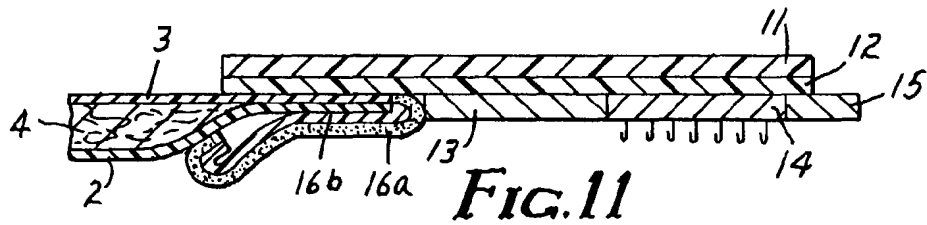
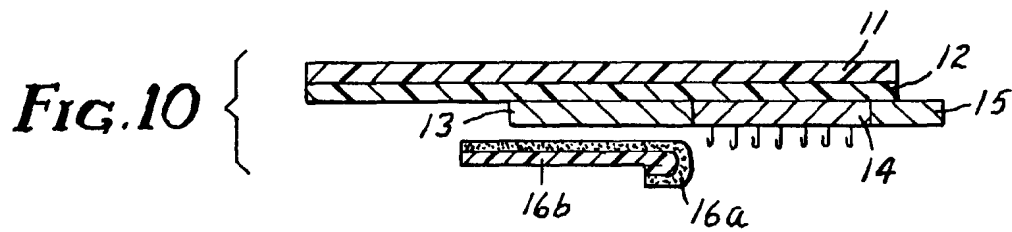
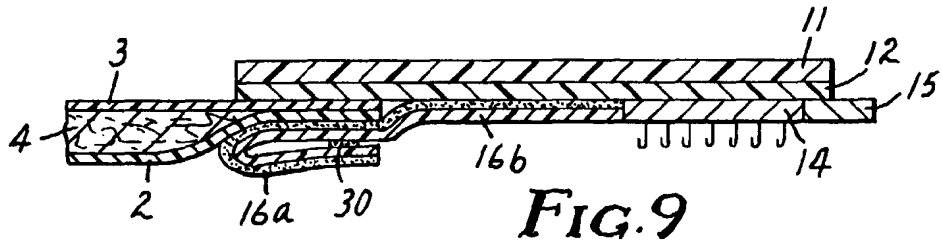
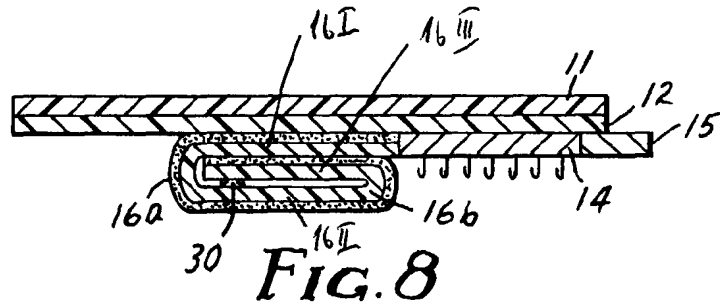
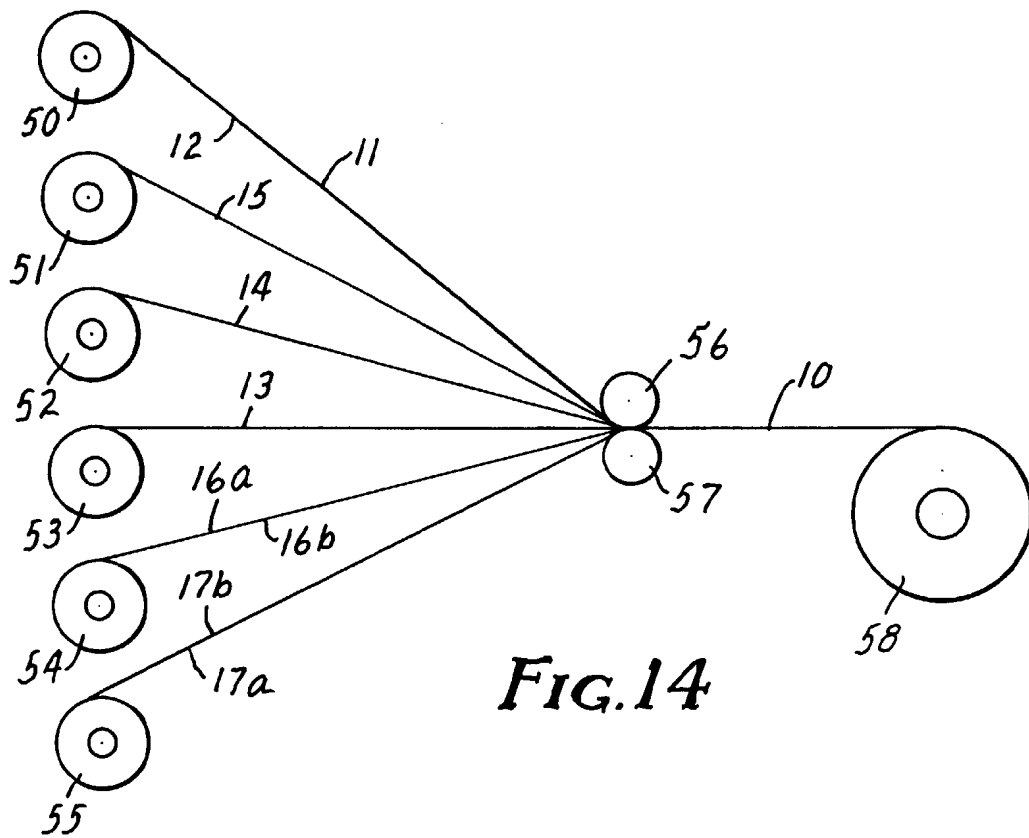


FIG. 5



**FIG. 7**







European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 98 10 4590

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A,D	EP 0 321 232 A (PROCTER & GAMBLE) 21 June 1989 * claims; figures *	1-8	A61F13/58
A	WO 96 21413 A (MINNESOTA MINING & MFG ;TUSCHY JOERG OTTO PAUL (DE); DAHM AXEL JOH) 18 July 1996 * abstract; figures *	9-11	
A,D	EP 0 780 109 A (KOESTER GMBH & CO KG) 25 June 1997 * claims; figures *	1-7	
A	WO 97 28774 A (AVERY DENNISON CORP) 14 August 1997		
A	EP 0 563 457 A (PROCTER & GAMBLE) 6 October 1993		
A	EP 0 324 578 A (MINNESOTA MINING & MFG) 19 July 1989		TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A61F
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>20 August 1998</b>	Examiner <b>Sánchez y Sánchez, J</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons  &amp; : member of the same patent family, corresponding document</p>			

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